

Cedar Keys

National Wildlife Refuge

Background Information



North Key
USFWS Ken Litzenberger



Black-crowned Night Heron
USFWS

Location

Cedar Keys National Wildlife Refuge is located along the western coast of Florida, approximately 90 air miles north-northwest of Tampa and 60 miles southwest of Gainesville. Located in Levy County along the southern edge of the Big Bend Region, the 13 islands that make up the refuge surround the coastal town of Cedar Key, Florida, where State Road 24 terminates at the Gulf of Mexico (Fig. 6).

History

Cedar Keys National Wildlife Refuge was established on July 16, 1929, by Presidential Executive Order 5158 to protect a breeding ground for colonial nesting migratory birds. The Executive Order included North Key, Snake Key, and Bird (Deadman's) Key. A second Executive Order, dated November 6, 1939, added Seahorse Key to the refuge. Congressional legislative mandate number 92-364, dated August 7, 1972, designated Seahorse Key, Snake Key, North Key, and Deadman's Key as National Wilderness Areas under the Wilderness Act of September 3, 1964 (Public Law 88-577). During the late 1970s and 1980s, additional interior coastal islands surrounding the town of Cedar Key were purchased for inclusion in the refuge. In 1998, the Suwannee River Water Management District purchased Atsena Otie Key and added it to Cedar Keys Refuge through a Memorandum of Understanding. Today, Cedar Keys Refuge is comprised of 13 islands ranging in size from 1 to 120 acres and totaling 762 acres.

Purpose

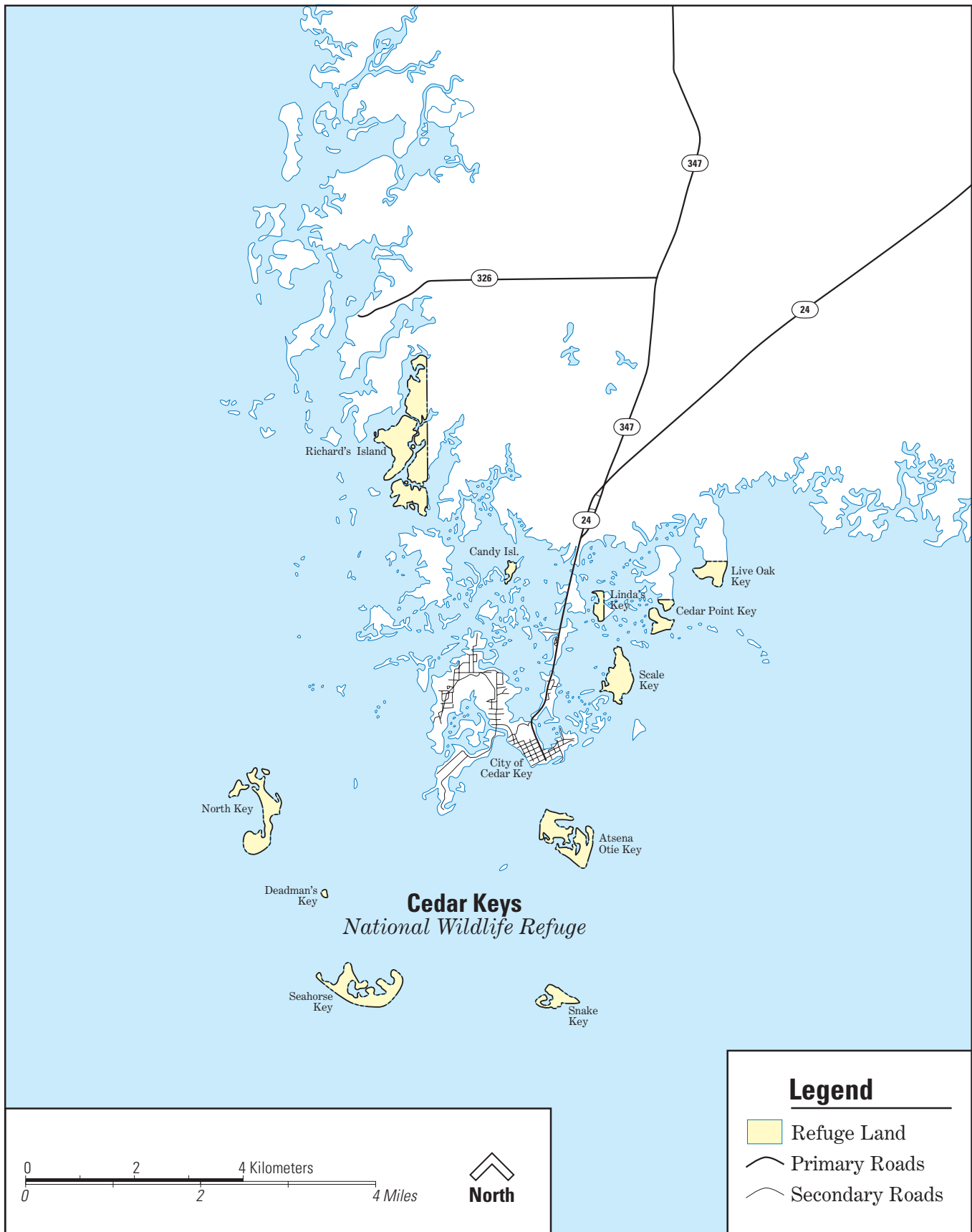
The purpose of Cedar Keys National Wildlife Refuge is:

"..as a refuge and breeding ground for birds and wild animals, subject to valid existing rights...." Executive Order 5158, July 16, 1929,
 "...suitable for - (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species...." 16 U.S.C. § 460k-1, and
 "...the Secretary...may accept and use...real...property. Such acceptance may be accomplished under the terms and conditions of restrictive covenants imposed by donors...."
 16 U.S.C. § 460k-2, as amended.

Cedar Keys National Wildlife Refuge was established to protect colonial birds during a time when market hunters, desiring feathers for the ladies' apparel industry, were slaughtering millions of birds. Today, the threat is much different - coastal islands are being rapidly developed and habitat is lost forever. Seahorse Key has been designated critical habitat for colonial wading birds. Historically, up to 200,000 birds nested on Snake and Seahorse Keys. Recent data shows approximately 10,000 white ibis; great, cattle, and snowy egrets; great blue, little blue, black-crowned night, yellow-crowned night, and tri-colored herons; cormorants; and brown pelicans nest on Seahorse Key annually. Snake Key has not been used for nesting since the late 1960s.

The Suwannee River Water Management District purchased Atsena Otie Key to protect water quality and to provide recreational opportunities in a natural setting. The refuge islands, with their undisturbed, natural plant communities, are important stopover points for migrating neotropical songbirds. They are important loafing and feeding areas to thousands of

Figure 6. Vicinity Map, Cedar Keys National Wildlife Refuge



shore birds and provide habitat for threatened and endangered species, and species of special concern in the State of Florida. The refuge provides limited public recreation and environmental education.

Function within the Ecosystem

Cedar Keys National Wildlife Refuge includes important coastal barrier island habitat with maritime forests, salt marsh, and the northern most limit of mangrove swamps. About 50 percent of Florida's salt marsh and more than 3,000 square kilometers of seagrass beds occur in the Big Bend Region, providing habitat for migratory birds, anadromous and interjurisdictional fish, and threatened and endangered species. The blend of these estuary and riverine habitats creates a large, complex system which exhibits how watersheds function.

Once a sleepy fishing village, the town of Cedar Key has become a unique nature tourist and sportfishing destination. The refuge protects island habitat that would possibly be developed to accommodate increased tourism. The seagrasses surrounding the islands are important for local shell fisheries and provide valuable habitat for manatees and juvenile sea turtles. Seahorse Key is home to one of the largest colonial wading bird rookeries in North Florida.



Cedar Keys Pier
USFWS Allyne Askins

Agreements

- Memorandum of Understanding with the Suwannee River Water Management District for the Service to manage Atsena Otie Key as part of Cedar Keys National Wildlife Refuge.
- Lease agreement with the State of Florida, Division of State Lands, for the Service to manage a 300-foot buffer zone of state waters surrounding Seahorse Key.
- Special Use Permit with the University of Florida enabling the University to use the Seahorse Key lighthouse and approximately 3 acres around the lighthouse for the purposes of marine science education and research.
- Memorandum of Understanding between the Service and the State of Florida, Department of Agricultural and Consumer Services, Florida Division of Forestry, to provide wildfire suppression.
- Memorandum of Understanding between the Service and Levy County Sheriff's Department allowing either agency to provide emergency assistance to the other upon request.
- Written permission from the Levy County Board of County Commissioners to maintain a kiosk with interpretive information on the county-owned dock in the town of Cedar Key.



Atsena Otie Kiosk
USFWS Allyne Askins



Young Ibis
USFWS ©Ken Sourbeer

Proposed Management Direction



Great Egret
USFWS ©Bruce Colin

Mission

The mission of Cedar Keys National Wildlife Refuge is to protect, maintain, and enhance the unique barrier islands that compose the refuge for the benefit of present and future generations, while protecting the colonial nesting birds.

Vision Statement

The Cedar Keys National Wildlife Refuge is a group of fragile coastal islands that contain significant natural and cultural resources. The refuge will be managed for the conservation of wildlife and wildlife habitat, with special concern for migratory and breeding birds and threatened and endangered species. Management will protect cultural resources and support environmental education, research, and where appropriate, other compatible uses. Management will partner with local, state, and federal agencies; community organizations; and individuals to ensure the protection of these resources for present and future generations.

Management Alternatives

Once the key issues and concerns were identified through the scoping process, it was evident that the number of reasonable alternatives for this refuge is limited by its small size and the need to protect critical habitat and the colonial bird rookery. Appendix B contains a full review of the alternatives considered and their impacts on the socioeconomic, environmental, and cultural resources along with alternatives discussed but not fully developed.

Alternative A: Maintain Current Management
(No Action)

Alternative B: Enhance Protection with Public Awareness and
Education (Proposed Action)

Proposed Management Action

The proposed management action was selected based on conformity with the refuge's mission, vision, ecosystem function, current uses, and needs expressed by the public during the scoping process. The proposed management action will identify biological monitoring and research needs which will result in a better understanding of the use of refuge resources by threatened and endangered species, migratory



Cub Scouts
USFWS A. Askins

birds, and resident wildlife. The proposed management action will result in increased protection of these natural resources, cultural resources, and water quality. It will also result in the restoration of refuge habitats, the maintenance of current public use programs and facilities, and the development of an expanded environmental education program.

An overriding concern, reflected in the draft plan, is that wildlife conservation assumes first priority in refuge management. Public uses will be allowed—where compatible, and if they do not negatively affect the fragile flora and fauna of the refuge. Wildlife-dependent uses such as environmental education and interpretation, wildlife observation, wildlife photography, and fishing will be the emphasized. Improved outreach and environmental education will inform school

students, local citizens, and tourists of the rich cultural and natural history and the need to protect these resources. Extensive wildlife and plant inventories, as well as monitoring programs, will be initiated to develop the biological information needed to make management decisions. Resource protection will be increased through better staffing and outreach. Partnerships will be improved and developed to increase environmental awareness and to achieve wildlife and habitat objectives.

The end result is a set of goals, objectives, and strategies related to key issues that will guide management of the refuge for the next 10 to 15 years.

Goals, Objectives, and Strategies to Support the Proposed Management Action

Four management goals for the refuge were developed from several workshops held during the scoping process.



Planning Team
USFWS A. Askins

- **Wildlife and Habitat** Manage and conserve the natural diversity, abundance, and ecological function of refuge flora and fauna, with an emphasis on protecting the colonial wading bird rookery of Seahorse Key, threatened and endangered species, and species of special concern in the State of Florida.
- **Resource Protection** Protect natural, cultural, and wilderness resources of the refuge to ensure their integrity and to fulfill the mission of the National Wildlife Refuge System.
- **Public Use** Provide opportunities for environmental education and interpretation and wildlife-dependent recreation when compatible with the purpose, mission, and vision of the refuge, provided these activities will not negatively affect critical or sensitive habitats.

- **Partnerships** Promote collaboration and partnerships with private citizens and other agencies to increase research and environmental education opportunities and to protect the coastal ecosystem.

The goals, objectives, and strategies are the Service's response to the issues and concerns expressed by the planning team and the general public at the workshops, public meetings, and in the comment packet, and will be used to implement the proposed management action. These goals, objectives, and strategies reflect the refuges's commitment to achieving the missions of the Service and of the National Wildlife Refuge System; ecosystem priorities; refuge purposes, mission and vision; and the expressed needs of the public—provided that necessary funding requirements are met.

Wildlife and Habitat

Goal

1. Manage and conserve the natural diversity, abundance, and ecological function of refuge flora and fauna, with an emphasis on protecting the colonial wading bird rookery, of Seahorse Key, threatened and endangered species, and species of special concern in the State of Florida.

Objective

- 1.1 Continue to monitor colonial bird nesting.

Strategies

- 1.1.1 Conduct colonial bird rookery flight line surveys at Seahorse Key annually from March through June to determine species present and to develop population indices.
- 1.1.2 Conduct an aerial survey of pelican nests on Seahorse Key annually to determine the nesting population.
- 1.1.3 By 2002, develop an unintrusive method to estimate nesting success.

Objectives

- 1.2 Continue efforts to reestablish colonial nesting on Snake Key. Refuge records indicate that Snake Key was the primary refuge island used by white ibis for nesting prior to the late 1960s.



Brown Pelicans
USFWS ©Ken Sourbeer



Ibis

USFWS Ken Litzenberger

- 1.2.1 Continue to remove raccoons (if present) from the island using snares, live traps, and by shooting.
- 1.2.2 Continue to use decoys annually (February through June) to attract colonial birds to the island.
- 1.2.3 By 2002, explore and determine other methods of restoring nesting bird use to the island.

Objective

- 1.3 Continue to monitor bald eagle nests.

Strategies

- 1.3.1 Conduct annual surveys of eagle nests to determine nesting success and number of young fledged.
- 1.3.2 In 2001, locate bald eagle nests using a GPS system. By 2006, develop an eagle management layer on the refuge's GIS data base.

Objective

- 1.4 Continue to monitor osprey nesting.

Strategies

- 1.4.1 Conduct annual surveys of osprey nests on the refuge to determine nesting success and number of young fledged.
- 1.4.2 Annually inspect and evaluate artificial nesting platforms. Repair, add new platforms, relocate, or remove platforms depending on use and need.
- 1.4.3 In 2001, locate all osprey nests and platforms. By 2006 using a GPS system develop an osprey management layer on the refuge's GIS data base.

Objective

- 1.5 Identify exotic plant and animal species on the refuge and develop strategies to eliminate or control them.

Osprey on Platform
USFWS





Treating Brazilian Pepper
USFWS Ken Litzenberger

Strategy

- 1.5.1 Continue to actively pursue the elimination of Brazilian pepper trees from the refuge using the recommended herbicide.

Objective

- 1.6 By 2005, develop a list of the flora and resident fauna present on the refuge.

Strategy

- 1.6.1 By 2006, locate flora using a GPS unit to create a management layer in the GIS database and to monitor habitat changes over time.

Objective

- 1.7 Determine the importance of Cedar Keys Refuge to resident and migratory birds.

Strategies

- 1.7.1 Continue to conduct the annual Audubon Christmas bird count.
- 1.7.2 In 2001, initiate an annual breeding bird survey for the islands.
- 1.7.3 In 2001, initiate a shore bird survey for the islands to be conducted each spring and fall. Data collected will be provided to the Manomet Bird Laboratory for the nationwide shore bird database.
- 1.7.4 By 2003, identify necessary feeding and loafing areas and, if necessary, protect them from disturbance through closure.

Objective

- 1.8 By 2010, conduct a Biological Review. Ideally, this review would have occurred prior to the initiation of this plan. It will be necessary, however, to conduct this review prior to its revision to determine if outlined biological strategies and the wildlife management plan are resulting in good science and sound management practices.

Resource Protection

Goal

- 2. Protect the natural, cultural, and wilderness resources of the refuge to ensure their integrity and to fulfill the mission of the National Wildlife Refuge System.

Objective

- 2.1 Continue to protect the colonial bird rookery from human disturbance.

Strategies

- 2.1.1 Annually, maintain a Closed Area around the island with a 300-foot buffer zone from March 1 through June 30.
- 2.1.2 Continue to conduct regular law enforcement patrols during the nesting season to enforce the closed area regulations.

Objectives

- 2.2 Protect the bald eagle nests by monitoring disturbance and, if necessary, close areas around the nests to the public during the nesting season.



Atsena Otie Beach
USFWS

- 2.3 By 2005, revise and update the refuge's Law Enforcement Plan.
- 2.4 Identify lands that will improve resource protection and aid in fulfilling the mission and purpose of the refuge and seek funding to acquire those lands .
 - 2.4.1 By 2006, conduct a Wilderness Review. The purpose of a Wilderness Review is to determine if any additional refuge lands or waters meet the qualifications of wilderness. Any lands determined to meet these criteria will then be nominated for inclusion as wilderness areas.

Objective

- 2.5 Protect refuge cultural resources in accordance with federal and state historic preservation legislation and regulations.

Strategies

- 2.5.1 Conduct law enforcement patrols at all known archaeological sites on a regular basis to inspect for disturbance and illegal digging and looting.
- 2.5.2 Maintain historical buildings and sites listed on the National Historic Register in accordance with appropriate guidelines.
- 2.5.3 By 2003, compile a comprehensive literature review of past archaeological, anthropological, and historical investigations within and near the refuge.
- 2.5.4 By 2005, produce an annotated bibliography to document the region's history.
- 2.5.5 By 2006, develop a GIS layer for the refuge's archaeological and historic sites.
- 2.5.6 By 2008, procure funding to inventory, analyze, and curate the archaeological collections from the 1990s excavations of three shell middens located on Seahorse Key.

Seahorse Key Lighthouse
USFWS



- 2.5.7 By 2010, develop and implement a plan to protect identified archaeological sites in consultation with the Regional Archaeologist, State Historic Preservation Office, Native American tribes and the professional archaeological community. (Resource Project 6)

Public Use

Goal

3. Provide opportunities for environmental education and interpretation and wildlife-dependent recreation when compatible with the purpose, mission, and vision of the refuge, provided these activities will not negatively affect critical or sensitive habitats.

Objective

- 3.1 Maintain and expand partnerships with the Suwannee River Water Management District, local government and interested organizations to promote and provide interpretation and wildlife-dependent recreation on Atsena Otie Key.

Strategies

- 3.1.1 Continue, in partnership with Cedar Key Historic Society, to identify historic features of the island and develop outreach materials to interpret them.
- 3.1.2 Maintain existing interpretive kiosk and panels, trail, and restroom to ensure visitor safety and comfort.
- 3.1.3 By 2003, develop interpretive materials for the natural and cultural features of the island. (Resource Project 7)

Objective

- 3.2 Expand partnership with University of Florida to promote environmental education and outreach to 2,000 students annually.

Strategies

- 3.2.1 Continue to hold annual open house tours of the lighthouse and surrounding facilities.
- 3.2.2 By 2002, develop an interpretive video about the refuge to be viewed by user groups of the Marine Laboratory.

Objective

- 3.3 Expand partnership with the Levy County School District for educational opportunities on the refuge.

Strategies

- 3.3.1 By 2001, develop at least three refuge specific lesson plans on wetlands and wetland species for local school teachers and community organizations.
- 3.3.2 By 2002, become more involved with the Interdisciplinary Watershed Education Program by providing refuge projects and programs for the students.
- 3.3.3 By 2003, develop teacher workshop materials and host a teacher workshop at the marine laboratory and lighthouse of Seahorse Key.
- 3.3.4 By 2005, become an active partner with the Levy County School District, the University of Florida,



Bird Watching at Cedar Keys
USFWS Ken Litzenberger



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and the Florida Fish and Wildlife Conservation Commission's Cedar Key Marine Lab in the development of a Marine Environmental Education Center in Cedar Key. (Resource Project 5)

Objective

- 3.4 Provide wildlife observation, interpretation, and photography opportunities throughout the year for 30,000 visitors annually, while protecting important coastal habitat and water quality.

Strategies

- 3.4.1 Continue partnership with Levy County Board of Commissioners and the Suwannee River Water Management District to provide interpretive materials which are located on the county-owned dock in Cedar Key.
- 3.4.2 Continue to maintain and update refuge brochures and web pages to provide the most up-to-date and accurate information possible.
- 3.4.3 In 2001, develop a "Friends of the Refuge" group and expand the volunteer program to assist with educational and outreach efforts.
- 3.4.4 By 2002, develop and provide interpretive materials about the refuge to marinas and commercial boat tour and boat rental operations. This will better inform 10,000 visitors annually about the role of the refuge in the coastal ecosystem.
- 3.4.5 By 2002, identify site for visitor center for Cedar Keys and Lower Suwannee National Wildlife Refuges that would provide both indoor and outdoor environmental education classrooms and display space. (Resource Project 2)

Partnerships

Goal

4. Promote collaboration and partnerships with private citizens and other agencies to increase research and environmental education opportunities and to protect the coastal ecosystem.

Objectives

- 4.1 Continue to seek additional contacts with the University of Florida, Departments of Zoology and Wildlife Ecology to expand refuge-based research. (Resource Projects 3, 4, & 8)
- 4.2 By 2002, through cooperation with the University of Florida Marine Research Lab, identify and secure funding for research projects that will aid in the protection and management of trust resources on and around Cedar Keys. (Resource Project 4)
- 4.3 By 2003, develop and submit a grant to the National Fish and Wildlife Foundation and a matching cooperator for an outreach or educational project.
- 4.4 Seek mutual cooperation with recognized Native American tribes in Florida to protect Native American sites on the refuge.

- 4.5 By 2003, negotiate and implement a long-term archaeological research agreement with the Department of Anthropology at the University of Florida and the Museum of Natural History.

Plan Implementation

Partnerships

A key component to implementing this comprehensive conservation plan is the establishment, development, and expansion of partnerships. Significant existing partnerships that have improved the refuge include the University of Florida, Suwannee River Water Management District, Levy County Board of County Commissioners, and Cedar Key Chamber of Commerce. Local organizations that have contributed to the operation of the refuge include Cedar Key Historical Society, Cedar Key Garden Club, and The Nature Coast Conservancy. In addition, private individuals who volunteer to assist with various projects have been and will continue to be an important partnership factor. Personal contacts and working relations have been established with other organizations including Florida Fish and Wildlife Conservation Commission's Cedar Keys Marine Research Laboratory, Cedar Key Schools, Levy County School District, and Cedar Key City Commissioners.

Partnerships with state environmental agencies, local educational agencies, and local citizens—if strengthened—have the greatest potential to benefit refuge resources. Research, biological, and environmental monitoring programs will be strengthened through closer partnerships with the Suwannee River Water Management District, the University of Florida and the Florida Fish and Wildlife Conservation Commission. Environmental education and greater ecological awareness will be improved through expanded partnerships with the University of Florida, the Florida Fish and Wildlife Conservation Commission, and the Levy County School District. The limiting factors to educational and biological partnerships are the lack of funding and staffing to nurture these programs.

Many other agencies and organizations exist at the local, regional, and state level that have or can contribute to the refuge through partnerships. The number of partnerships generated is limited only by our imagination and the level of commitment by the Service.

Annual Work Plans

Future annual work plans will be developed to reflect the priorities and intent of this comprehensive conservation plan. When discretionary funding and staff are available, these work plans will be used to implement components of the comprehensive conservation plan.

Step-Down Management Plans

This comprehensive conservation plan provides conceptual guidance for potential future expansion, management, and development of the refuge. Step-down management plans are individual and subject-specific. Examples of step-down plans are fire, forestry, and hunting. The refuge's approved step-down plans are listed below. Before implementing strategies and projects, some of these specific plans may need revisions while others will need to be developed.



Dock Panels
USFWS Allyne Askins



Fishing
USFWS Ken Litzenberger

Approved Plans

- **Aircraft Pre-Accident Plan and Hazard Map** Aircraft are used for fire control, habitat monitoring and biological surveys. The objective of this plan is to outline general procedures to be followed during routine flights and flight emergencies. (Revised 5/6/94).
- **Continuity of Operations Plan** It is important to maintain the capability to perform essential activities and functions under all circumstances and situations, including human-caused, natural, technological, and national security emergencies that may occur with or without notice. This plan identifies functions necessary for safety and the continuity of operations. (Written 8/10/98)
- **Fire Management** The purpose of the Fire Management Plan is to provide objectives and guidelines for managing refuge habitat. The plan provides a detailed program of action to implement fire management policies and objectives in accordance with the Fire Management Preparedness Handbook (621 FW). The Fire Management Plan for Cedar Keys Refuge is incorporated in the Lower Suwannee Refuge plan. (Approved 1/8/97)
- **Hurricane** The objective of this plan is to outline general procedures to be followed during and after hurricanes which may occur on or near Lower Suwannee and Cedar Keys Refuges. (Approved 12/17/90)
- **Pest Control** The purpose of this plan is to identify methods to reduce or eliminate raccoons on Snake Key in an effort to restore the island to colonial nesting birds. It was revised in January 2000. (Approved 5/21/93)

Approved Plans, Scheduled for Revisions

- **Law Enforcement** This plan is incorporated in the plan for Lower Suwannee National Wildlife Refuge. Its purpose is to provide refuge staff with a ready reference to Service, regional and state policies, procedures, and programs concerning refuge law enforcement activities. The present plan was approved on March 29, 1988, and is outdated. It will be revised by 2005.
- **Visitor Services Management Plan (Public Use Management Plan)** The purpose of the Public Use Management Plan, now referred to as the Visitor Services Management Plan, is to outline strategies to accomplish the refuge's public use goals without compromising the original purpose for which the refuge was established. The refuge's plan is incorporated in the plan for Lower Suwannee National Wildlife Refuge (Approved 1/7/86). It will need to be revised in the year 2002.
- **Fishing** The purpose of the Fishing Plan is to identify public fishing opportunities on the refuge. It was approved on 1/8/85. To be revised by 2001, it will be incorporated in the Visitor Services Management Plan.
- **Wildlife Management Plan (Wildlife Inventory Plan)** The purpose of the Wildlife Inventory Plan is to establish which species to inventory, standard techniques for conducting the inventories, and projected costs (Approved 4/21/86). This plan is now obsolete. A Wildlife Management Plan will be written to replace this plan. This project is to be completed by 2004.

Needed Plans or Reviews

- **Cultural Resource Management Plan** The purpose of this plan will be to clearly delineate the historic preservation process for the refuge, develop strategies to identify and assess the refuge's historic properties, identify appropriate site protection measures, and identify current and potential partners. The plan shall be in place by 2005.
- **Biological Review** Ideally, this review would have occurred prior to the initiation of this comprehensive conservation plan. It will be necessary to conduct a Biological Review prior to revision of the plan to determine

if biological strategies outlined in both it and the Wildlife Management Plan are resulting in good science and sound management practices. This review should occur by 2010.

■ **Wilderness Review** The purpose of a Wilderness Review is to determine if any additional refuge lands or waters meet the characteristics of wilderness. Any lands determined to meet these criteria will then be nominated for inclusion as wilderness areas. The Wilderness Review will be conducted by 2006.

Funding and Staffing

Cedar Keys National Wildlife Refuge has no staff and receives no funding. All protection, management, biological monitoring, and public outreach are accomplished with funds and staff from Lower Suwannee National Wildlife Refuge, when those resources are available. Cedar Keys Refuge is small and does not require a large staff, but its natural and cultural resources are important, and use of the refuge's pristine beaches and natural maritime forests by the public is increasing. In 1970, there were an estimated 900 visitors to the refuge and 600 of them were associated with the University of Florida's use of the marine science laboratory on Seahorse Key. In 1980, there were 2,800 visitors to the refuge and in 1999, there were approximately 30,000 visitors. To meet this growth and to properly manage and protect these resources, Cedar Keys Refuge must receive funding and staff.

Biological monitoring, research, and coordination with other resource-research-oriented agencies, as outlined in the objectives under goal number one of this plan, can only be accomplished by having a full-time biologist position to oversee the biological program of Cedar Keys Refuge. Concerning environmental education and outreach, only minimal efforts will be made unless a person dedicated full time to nurture these programs is hired. This person would have dual responsibilities for both Lower Suwannee and Cedar Keys Refuges. Tremendous potential exists for programs with local and state partners as well as outreach to many visitors if an outdoor recreation planner/environmental education specialist is hired. In addition to the biologist and outreach positions, a technician is necessary to maintain facilities, signs, and equipment; conduct law enforcement patrol for protection of resources and visitors; and to assist with biological monitoring efforts. The secondary assistant refuge manager, or refuge operations specialist, stationed at Lower Suwannee Refuge for the purpose of career development, will be given the responsibility of overseeing daily operations of Cedar Keys Refuge. A minimum of three staff people and appropriate operational funding is needed in order to complete the objectives and strategies of this plan.

Funding can come through a variety of internal and external sources. Refuge maintenance and operation funds should be allocated. The Service also needs to explore ways to leverage dollars through new and innovative matching grant programs with public and private sources. Without funding, the refuge will continue to operate at its present minimal level and the "No Action Alternative" will become the implemented alternative, with the Service not meeting its mandates for protecting the natural resources and providing public use at Cedar Keys National Wildlife Refuge.

Resource Projects

Several resource projects directly support the refuge's goals and objectives. They do not necessarily fit under one particular goal, but rather support several goals.

Project 1

Initial Base Funding Base funding is needed to employ personnel and cover normal, routine expenses. Three new staff positions and their connection to refuge goals are identified in the funding and staffing section



White Ibis
USFWS

of this plan. These positions will require equipment and transportation and will increase utility expenses (fuel, electricity, telephone). The estimated initial cost for these three full-time positions including salary, benefits, equipment, and operation needs is approximately \$300,000. The recurring annual cost would be approximately \$250,000.

Project 2

Administrative Facilities, Visitor Services, and Education Center

Construction of a headquarter's facility is needed and would include a visitor center with interpretive displays, exhibits, and book store; an environmental education classroom; a large conference room; and six administrative offices. This facility will also serve Lower Suwannee National Wildlife Refuge and will be in a location that supports both refuges and will serve a large number of visitors. The estimated construction cost is \$2,000,000.

In lieu of a visitor center, a smaller administrative office and visitor contact station could be constructed. This facility would still support both refuges and have space enough for minor exhibits and a meeting room. The cost for the project would be approximately \$400,000. (The costs associated with either facility were identified in the projects listed in the Lower Suwannee National Wildlife Refuge Comprehensive Conservation Plan and does not represent additional funding needs.)

Project 3

Study of Mercury Contamination at Seahorse Key Compared with Other Rookeries in Florida In 1998, the Seahorse Key colonial bird rookery was used as the control site in a comparison of contaminated sites to distinguish the effect of mercury on juvenile survival, as well as to determine the relative importance of mercury in the egg and mercury acquired through food as a nestling. Surprisingly, mercury levels in white ibis and great egret chicks at Seahorse Key were found to be some of the highest in the state. In 1999, the statewide sample was not collected, but the sample at Seahorse Key was continued in an effort to determine the source of the mercury concentration. Mercury levels in 1999 were approximately 63 percent lower than in the previous year. Researchers also conducted following flights to identify where the adult birds were feeding. The data suggests that most birds are feeding in salt marshes. Traditionally, the birds used predominantly freshwater areas for feeding. However, during the 1999 survey the area experienced drought conditions and fresh water was limited. This study would continue the research to determine where the birds from the rookery are foraging and if the source of mercury is from the freshwater wetlands where they forage. The approximate cost of this project is \$50,000.

Project 4

Amphibian and Reptile Population Dynamics Refuge islands support healthy amphibian and reptile populations, including high densities of venomous snakes. Due to habitat conditions on the islands, the lack of standing fresh water, and dependence on colonial birds for food, these populations and their dynamics and relationships to avian use need to be assessed. An extension of this study would be the mercury contamination study of project number 3. The snakes feed on eggs, young birds, and dropped food that adult birds bring to the nest for their young. The mercury levels of the birds should be reflected in the snakes. The University of Florida is interested in this research and would provide professors and students as principal investigators. The research would take 2-3 years to complete at an estimated cost of \$120,000.

Project 5

Develop Education Facilities Comments from the public during the scoping process clearly indicated the need for and support of improved environmental education opportunities. The refuge is part of the Aquatic

Education Advisory Committee in Cedar Key with Florida's Marine Research facility, the University of Florida, and Levy County Schools. This committee has identified the need for an outdoor classroom facility in Cedar Key, off refuge property. Ideally, it would be located next to the state's research facility. The facility would include a pole shed type structure with running water, electricity, wet and dry diagnostic tanks; and facilities for lodging and feeding the students. These facilities could serve school children of all ages, not only in the tri-county area, but throughout the state. The Service's share of the cost is estimated at \$100,000.

Project 6

Archaeological and Historical Survey A comprehensive archaeological survey of the refuge should be conducted. A portion of the Cedar Keys Historic and Archaeological District, listed on the National Register of Historic Places, is on the refuge. Included in the district are a number of Native American sites, many dated to between 500 B.C. and 12 A.D.; the town of Atsena Otie Key; the Seahorse Key Lighthouse; and several Native American and historic period cemeteries. This project is critical to identifying, mapping, protecting, and interpreting the refuge's cultural resources. The estimated cost is \$200,000 and is included in the Lower Suwannee National Wildlife Refuge Comprehensive Conservation Plan.

Project 7

Atsena Otie Key Enhancements Depending on the tides, the deck of the public dock at Atsena Otie Key is 6 to 8 feet above the water. In order to improve visitor safety, hand rails need to be constructed on both sides of the 400-foot-long dock. In 1999, a kiosk was constructed on Atsena Otie Key. It provides general information about Cedar Keys National Wildlife Refuge and its history. Additional information panels are needed along the trail and a map panel is needed at the kiosk. Interpretive panels will improve the visitor experience and provide information about the natural and cultural resources. The estimated cost for this project is \$20,000.

Project 8

Sea Turtle Population Use The near shore habitat along the north-central Gulf Coast of Florida is important summering grounds for three sea turtle species: loggerhead, green, and Kemp's ridley. The Kemp's ridley sea turtle is the most endangered of the seven extant marine turtle species. Grassbed, channel, and flats habitats are important feeding areas for all three species. Such habitat in the Suwannee Sound, including miles of refuge coastline, may be critical to survival of the

Table 3. Funding Needs for Special Resource Projects of Cedar Keys National Wildlife Refuge

PROJECTS	ONE TIME COST	FIRST YEAR NEED	RECURRING BASE
1. Initial Base Funding	\$300,000		\$250,000
2. Visitor Center et al.		**1	**
3. Mercury Study		50,000	
4. Amphibian Study	120,000		
5. Educational Facilities	100,000		5,000
6. Archaeological Study	**1		
7. Atsena Otie Key Enhancements	20,000		
8. Sea Turtle Use	50,000		

¹ Project shared with Lower Suwannee Refuge; funding was identified in the Lower Suwannee Refuge Resource Project Funding Table.

Kemp's ridley. This study would inventory sea turtles, determine relative abundance, identify patterns of habitat use, and determine seasonal use. The estimated cost for the study is \$50,000.

Volunteers

Volunteer assistance to the refuge continues to be stable. The number of volunteers is low, but those individuals who do volunteer have made substantial contributions to the refuge. Students, local organizations, and retired individuals have provided volunteer assistance. However, many opportunities exist through the implementation of this comprehensive conservation plan and through staffing to greatly expand volunteer involvement. The formation of an official, registered "Friends Group" for Lower Suwannee and Cedar Keys National Wildlife Refuges will provide a source for recruiting interested citizens, developing meaningful projects for the volunteers, and accomplishing refuge goals and objectives.

Monitoring and Evaluation

As indicated throughout this comprehensive conservation plan, the importance of monitoring flora and fauna and evaluating the effects of visitor use are critical to obtaining the stated goals and objectives. This plan will be augmented by revised, step-down management plans that will address specific types of monitoring and targeted species. Every 5 years the plan will be reviewed to document progress and reassess direction. Public involvement in evaluating progress and implementation will be encouraged.

Since Cedar Keys National Wildlife Refuge is a collection of small coastal islands with limited resources, monitoring is very important and achievable. Although not all inclusive, monitoring priorities include:

- colonial bird rookery
- neotropical bird use
- predation
- exotic species control
- natural vegetative communities
- aquatic grass beds
- water quality
- public use and impacts
- cultural resource

Brazilian Pepper

USFWS Ken Litzenberger

